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XLIV.—*Brachiopod Nomenclature.*

By S. S. BUCKMAN, F.G.S.

THE following remarks are presented in the hope that they may be of assistance in clearing up various difficulties connected with the names of some Brachiopod genera.

EPITHYRIS, HYPOTHYRIS, CLEIOTHYRIS, Phillips, 1841.

According to Dall* these genera are indeterminable from what Phillips has said about them, and so he establishes two of them on King's authority. Schuchert† does the same, definitely stating that King's genera are not Phillips's. But this arrangement can only be accepted as a temporary expedient. The generic names must stand or fall by what Phillips has done, and if they fall they cannot be revived in another sense. "Once used, always used."

However, I do not accept the dictum that Phillips's genera are indeterminable, or that Phillips did not sufficiently indicate his types, so that a subsequent author was free to select—though this would make them still Phillips's genera, not King's. Phillips, to my reading, indicated the types which he had in mind—not so definitely as he might have done, perhaps; but still he did indicate them. He says of the first

* Index Brach., Bull. U.S. Nat. Mus. 1877.

† Syn. Am. Brach., Bull. U.S. Geol. Survey, 1897.

two:—"Whoever will carefully examine the '*Terebratule*' of the strata below the Lias will find but few which can be supposed to exhibit a distinct oval or circular opening below the beak (such as belongs to *T. concinna*, for example), and perhaps none which show a truncate perforate beak (as, for example, in *T. maxillata*)" *.

Then he further says (p. 55): "*Epithyris* . . . beak truncate, perforate." "*Hypothyris* . . . beak acute, perforation below it." Putting these statements with those on the preceding page, it seems to be obvious that Phillips regarded as typical of his genera *Hypothyris* and *Epithyris* *T. concinna* and *T. maxillata* respectively.

Therefore one can say

Genus EPITHYRIS, Phillips, 1841.

Type *Terebratula maxillata*, Sowerby.

Non *Epithyris*, King, nec Deslongchamps.

This may stand as the generic name for a small but very distinct series of Jurassic Terebratulids. It includes *T. submaxillata*, Morris, *T. marmorea*, Oppel, *T. lentiformis*, Upton, *T. permaxillata*, S. Buckman, and another form which requires a new name. This may be called

Epithyris bathonica, nom. nov.

As type may be taken the specimen figured as *Terebratula maxillata*, Davidson, Brit. Ool. Brach. (Pal. Soc.) 1851, pl. ix. fig. 3 only. It is a larger and more massive shell than *T. maxillata*, Sowerby, properly represented in Davidson (pl. ix. fig. 1), and it grows to a much larger size before it begins to show plications. It is characteristic and fairly abundant in the Great Oolite, whereas *E. maxillata* characterizes the Bradford Clay below and *E. marmorea* the Forest Marble beds above; so that the distinction is of stratigraphical value.

Genus HYPOTHYRIS, Phillips, 1841.

Type *Terebratula concinna*, Sowerby.

The name *Hypothyris* cannot be used, as, according to Scudder, it is preoccupied—for a genus of Lepidoptera by Hübner in 1822.

The terms epithyrid and hypothyrid will be found extremely useful for describing the beak-characters which Phillips

* Pal. Foss. Corn. Devon, p. 54 (Mem. Geol. Surv. 1841).

noted. Most Terebratulids are epithyrid, but *Stringocephalus* is hypothyrid; most Rhynchonellids are hypothyrid, but *Terebratuloidea* is epithyrid—in other words, it is a Rhynchonellid with a truncate perforate beak.

The case regarding *Cleiothyris* is hardly so satisfactory as the others. Phillips's two statements are:—

“Cardinal area obsolete; beak incurved over a minute perforation, which is often obtect or merely serves to receive the beak of the smaller valve—*Cleiothyris*.”

“Under the head of *Terebratula* I shall include many of the *Atrypæ* of Dalman and Sowerby, giving this term and *Cleiothyris* as synonyms of a part of that great group. *Stringocephalus*, *Orthis*, and *Spirifera* will be separated. In this latter genus I include the analogues of *Spirifera lineata*, and which seem to conduct naturally to the smooth terebratuliform species now ranked as *Atrypa* by Mr. Sowerby” (p. 55).

“The effect of introducing the classification of Brachiopoda presented on pp. 54, 55, would be a modification of *Spirifera* and *Terebratula* by transferring a part of the species here included in these groups to *Cleiothyris* and *Hypothyris*. Until, however, the foramen of the larger valve is more carefully examined, in the plaited species analogous to *Terebratula pleurodon*, *T. pugnus*, &c., in the smooth species allied to *Terebratula concentrica* (von Buch) and *Spirifera imbricata* (Sowerby), and in those which rank with *Terebr. prisca*, it seems not desirable to disturb too much the existing methods of classification” (p. 92).

The first of these two statements signifies that *Cleiothyris* is not to replace *Atrypa*, but is to be used by the side of it, for “the smooth terebratuliform species now ranked as *Atrypa* by Mr. Sowerby.” In the next statement there are three divisions made:—(1) “plaited species”; (2) “smooth species”; (3) “[species] which rank with *Terebr. prisca*.” Obviously, then, *Cleiothyris* is the term for division 2, and in this are mentioned *Terebratula concentrica* (von Buch) and *Spirifera imbricata* (Sowerby). It may be argued that by saying *Spirifera imbricata* Phillips expressed his opinion as to its probable position, and so he left *Terebratula concentrica* to be the type of his genus.

There is further evidence for this in the footnote, p. 55. Phillips says “*Cleiothyris* . . . with the terms *Epithyris* and *Hypothyris* might console us for the loss of *Terebratula*, which in von Buch's view includes the three groups.” Evidently, then, *Cleiothyris* included a species called by von Buch a *Terebratula*.

The conclusion arrived at is that *Cleiothyris* cannot be used on King's authority at all, and if it be used on Phillips's foundation it takes priority of *Athyris*. M'Coy, indeed, admits as much when he says of *Athyris* (p. 146):—"Prof. Phillips is the only author who has recognized the group; he forms of it his last division of the genus *Spirifera*." Phillips's last division of the "Delthyridæ or Spirifers"—M'Coy uses this phrase—is *Cleiothyris* (Pal. Foss. p. 55).

As *Hypothyris* cannot be used for the *Atrypa* (*Rhynchonella*) *cuboides* series—first because it does not belong there, and second because it has been preoccupied,—it becomes necessary to name afresh. It is desirable to make as little change as possible, so there may be suggested

Genus HYPOTHYRIDINA, nom. nov.

Genotype *Atrypa cuboides*, Sowerby, = *Hypothyris*, King, Hall & Clarke, Schuchert et al. (non Phillips).

As *Cleiothyris* is not available on King's authority, and as it seems to be generally agreed that the *A. Royssii* series requires a separate name from *A. concentrica*, then a new term must be used:

Genus CLEIOTHYRIDINA, nom. nov.

Genotype *Athyris Royssii*, Davidson, Mon. Carb. Brach. pl. xviii. fig. 8. Syn. *Cleiothyris*, King et auct. (non Phillips).

COMPOSITA, SEMINULA.

The first of these generic designations has been entirely overlooked, yet it must be confessed that its author, Capt. Thomas Brown, has done his work much more accurately than his professorial contemporaries; he, at any rate, has definitely fixed and described his type thus:—"Genus *Composita*, Brown. Shell somewhat pentangular; hinge-line very short; beak of the larger valve produced, with a small circular perforation; inside furnished with spiral appendages.

"This genus is founded upon the *Spirifer ambiguus* of Sowerby and is intermediate between that genus and *Terebratula*. The perforated beak removes it from *Spirifer*, and the internal spiral appendages never exist in the genus *Terebratula*, but are peculiar to the genus *Spirifer*. 1. *Composita ambigua*, *Spirifer ambiguus*, Sowerby" *.

The date is given by Mr. C. Davies Sherborn in a pamphlet, "Conch. Writings of Capt. Thomas Brown," Proc.

* Brown Illust. Foss. Conch. Gt. Britain and Ireland, p. 131 (1845).

Malacol. Soc. vi. p. 358 (1905), and he it was who directed my attention to this work of Brown's.

Davidson remarks (Carb. Brach., Pal. Soc. 1857, p. 78 n.) "that *Spirifer ambiguus* has received no less than six different generic appellations." He overlooked Brown's term, which makes seven; and it had not then been given the name (the eighth) it now passes by—*Seminula*—for M'Coy did not mention it as one of his types.

It is, then, necessary to consider what is the type of M'Coy's genus *Seminula*. Dall merely cites the three species mentioned by M'Coy. Hall and Clarke say "Type *Seminula ambigua*, Sowerby, sp.," which M'Coy did not mention. Schuchert says "Genotype *Terebratula pentædra*, Phillips, = *Athyris ambigua* (Phillips)," which may be a lapse for (Sowerby). Now M'Coy has definitely indicated his own genotype by giving a figure (p. 150, fig. 31), and this figure is certainly *T. pentædra*, Phillips. But Davidson, who was more ready to combine than to separate, only united *T. pentædra* to *T. ambigua* with a query. One may reasonably feel much doubt about the association when it is remembered that Phillips kept the two species distinct and that M'Coy classed with *T. pentædra* as belonging to his *Seminula* two species which are recognized now as *Camarophoria*. Further, M'Coy says in regard to *Seminula* (p. 150) "perforation minute." This is not a description that could be applied to *T. ambigua*.

A glance at Phillips's original figure shows that *T. pentædra* is rightly described by M'Coy, and that it is quite different from *T. ambigua*. *T. pentædra* has a rhynchonelliform beak—it is evidently hypothyrid; but *T. ambigua* has a terebratuliform beak—it is epithyrid. Phillips's descriptions fully bear this out. Of *T. pentædra* he says "Perforation of the beak minute"; he applies the same description to *T. rhomboidea* and to *T. seminula*, but of *T. ambigua* he says "beak with a large round aperture"—in comparison with *T. pentædra* it is "large."

Therefore the type of *Seminula* is really a hypothyrid rhynchonelloid, congeneric with *T. seminula* and *T. rhomboidea*, which at present are called *Camarophoria*, and it has nothing to do with *T. ambigua*.

Therefore it must be said:—

Genus SEMINULA, M'Coy, 1844.

Genotype, species figured by M'Coy, fig. 31, p. 150, = *T. pentædra*, Phillips.

Non *Seminula*, Hall & Clarke, Schuchert et al.

Syn. *Camarophoria* (pars), Davidson et auctt.

Shells rhynchonelliform, hypothyrid, with the surface sinuate or feebly semiplicate.

The genus is nearest to *Camarophoria*; it is not one of the Athyridæ, but belongs to the family Pentameridæ. The later-named *Camarophoria* may probably be distinguished from it, as containing shells more transverse, more fully and more numerous plicate.

The species placed in it by M'Coy are rightly classed. Their distinction as three species of *Seminula* seems to be justifiable; but three names will be *S. pentaëdra* (Phill.), *S. seminula* (Phill.), *S. rhomboidea* (Phill.). The last is probably quite distinct enough from the Permian *T. globulina*, which is also a *Seminula*.

What has hitherto been called *Seminula* must be altered, thus:—

Genus COMPOSITA, Brown, 1845.

Type *Spirifer ambiguus*, Sowerby.

Syn. *Seminula*, Hall & Clarke, Schuchert et al.; non *Seminula*, M'Coy.

LEPTODUS, LYTTONIA.

In systematic works the generic name *Leptodus*, Kayser, is placed as a synonym of *Lyttonia*, Waagen; but this is not justifiable. Waagen had no right to give a new name because Kayser happened to place his genus among the fishes. So we must record thus:—

Genus LEPTODUS, Kayser, 1883.

Genoholotype *L. Richthofeni*, Kayser.

Syn. *Lyttonia*, Waagen.

Genus CYCLOTHYRIS, M'Coy, 1844.

Type, the species figured by M'Coy, Carb. Foss. p. 150, fig. 29, = *Terebr. latissima*, Sowerby.

Dall says that M'Coy's figure is indeterminable; but this is not justified. It is obviously a multiplicate *Rhynchonella*, and Davidson is quite correct in mentioning *Rh. latissima* as type. Thus it will be more correct at present to turn over to *Cyclothyris* the bulk of the present Mesozoic *Rhynchonella*—all those which are multiplicate and hypothyrid; leaving in true *Rhynchonella* only the species which are pauciplicate and hypothyrid, congruous with *R. loxia*—such series as the *R. acuta* group.

However, further division of the Mesozoic Rhynchonellids is imperative, if only for the sake of classificatory convenience; for the present genus is quite unwieldy, and therefore very troublesome for any systematic arrangement.

Summary.

[New names in heavy type.]

Cleiothyridina,	= <i>Cleiothyris</i> , auctt.
<i>Cleiothyris</i> , 1841,	= <i>T. concentrica</i> series.
<i>Composita</i> , 1845,	= <i>Seminula</i> , auctt.
<i>Cyclothyris</i> , 1844,	= <i>T. latissima</i> series.
<i>Epithyris</i> , 1841,	= <i>T. maxillata</i> series.
<i>Epithyris bathonica</i> ,	= <i>T. maxillata</i> (pars).
Hypothyridina,	= <i>Hypothyris</i> , auctt.
<i>Hypothyris</i> , 1841, preoccupied.	
<i>Leptodus</i> , 1883, precedes <i>Lyttonia</i> .	
<i>Lyttonia</i> , 1883, syn. of <i>Leptodus</i> .	
<i>Seminula</i> , 1844,	= <i>Camarophoria</i> (pars).

XLV.—*The Flying-fish Problem.*

By Lieut.-Colonel C. D. DURNFORD.

In a paper published in these 'Annals' for January 1906 the impossibility, from a mechanical point of view, of a flying-fish accomplishing sailing flight was shown. The argument was based upon the fact that as a flying animal the flying-fish is equipped with wings of a fractional sailing value compared with those of a sailing bird. Also that if the wings were many times larger, so as to bring the fish on an equality with the bird in this respect, it could only sail with the bird's limitations as regards direction of the wind, and with the bird's frequent assistance from rowing flight. Also that if the figures (which can be easily verified or, if wrong, refuted) are correctly given in the article, the accepted aeroplane flight is miraculous, unless a new law of Nature be discovered.

It is, then, perhaps advisable, if the present curious condition of the question is to be understood, to examine how it has come about.

The flying-fish problem is a very odd one in many ways, of which the most striking is the unexplained power therein of the negative to quench the positive. Throughout we find the aeroplanist's "I cannot see the wing-movement" smothering a fairly equal bulk of "I can, and have, and do see it."

Let us create a parallel instance, for a real parallel does